

CHAPTER INVESTIGATION

Homeostasis and Exercise

Your body's temperature, heart rate, and blood pressure need to remain within certain set ranges. In this lab, you will work in groups to examine the effects of exercise on the circulatory and respiratory systems and on perspiration level. You will then observe how the body reacts when exercise is stopped.

OBJECTIVES

- Relate homeostasis to the internal environment of the body
- Identify certain conditions in the human body that must remain within a narrow range to maintain life.

PROBLEM

How does exercise affect a person's heart rate, breathing rate, and perspiration level?

PRE-LAB

1. What is the average human heart rate? _____
2. What is the average human breath rate? _____
3. Why would it be useful for the heart to beat faster during exercise or in response to a stimuli? _____

4. What would be an activity that could lower a person's heart rate? _____

5. Clearly define homeostasis using your own words. Give an example besides the one we are investigating in this lab.

HYPOTHESIS

Write a hypothesis about the effect of exercise on the dependent variable that you are measuring, giving a possible explanation to the problem listed above, using and "If, then, because..." statement. You may read the procedure first, to gain a better understanding.

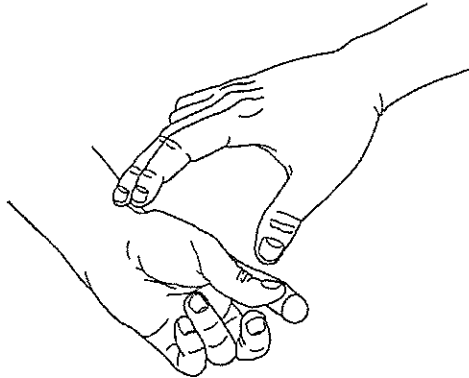


MATERIALS

- jump rope
- stop watch

PROCEDURE

1. Choose one volunteer to jump rope at a pace that can be maintained for eight minutes. Make sure the volunteer is inactive for a few minutes before the experiment begins.
2. Measure the heart rate by taking his or her pulse. To take the pulse, place your 2nd and 3rd fingers on the volunteer's wrist where it meets the thumb. Press very lightly to feel the pulsations. Count the number of beats in 15 seconds. Another student in the group will use the stopwatch to tell you when to start and when to stop.



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3. Multiply the number of beats in 15 seconds by 4 to calculate the beats per minute. Record the data in the Table 1 (0 minutes).
 $\# \text{ of beats} \times 4 = \text{beats per minute}$
 Resting heart rate calculations: _____
4. Measure the person's breathing rate by counting the number of breaths taken in 15 seconds. Multiply this number by four to calculate breaths per minute. Add this information to the table.
 $\# \text{ of breaths} \times 4 = \text{breaths per minute}$
 Resting breathing rate calculations: _____
5. Rate the person's perspiration level from 1 to 5 (1 = none; 5 = droplets dripping down the face). Note this observation in the table.
6. Have the volunteer jump rope for 2 minutes. **Caution:** If the person exercising feels discomfort at any time, stop the experiment and inform your teacher. After 2 minutes, measure heart rate, breathing rate, and perspiration level (refer to Steps 2 through 5), and record the data. Measure the pulse, breathing and perspiration levels as quickly as you can so that the volunteer can resume exercise. Do not have volunteer wait while you do the calculations and enter the data.
7. Repeat Step 6 three more times and record your data at each point.
8. After the final recording of the dependent variables, wait 1 minute with the volunteer at rest. Then measure all of the variables again. Record the data.

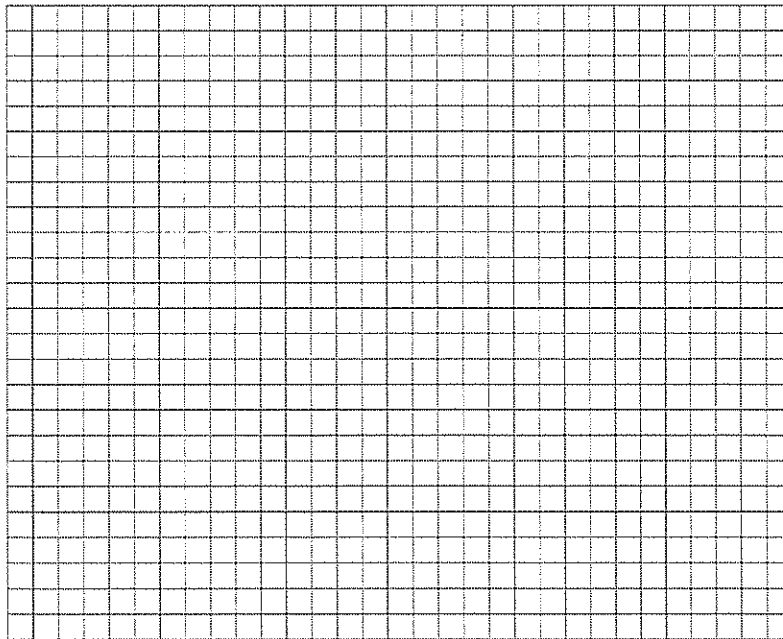
TABLE 1. EFFECTS OF EXERCISE			
Time (Min)	Heart Rate (Beats/Minute)	Breathing Rate (Breaths/Minute)	Perspiration Level
0			
2			
4			
6			
8			
9 (rest)			

Homeostasis and Exercise *continued*

ANALYZE AND CONCLUDE

1. Identify Variables What is the independent variable and name at least 3 controlled variables in this experiment?

2. Organize Data Graph the relationship between the independent and dependent variables. You may choose one graph to display all of your data, or you may use separate graphs for each of the dependent variables. Explain your graph choice. You must include a title, x-axis and y-axis labels and units where appropriate.



Homeostasis and Exercise *continued*

3. Summarize What are the effects of exercise over time on the circulatory and respiratory systems and on perspiration level? Use the data you collected to support your statements.

4. Synthesize What other processes could you have measured to determine the external and internal effects of exercise on the body?

5. Infer How is perspiration level related to body temperature? How is perspiration related to homeostasis? Be thorough in your response.
